

## Research Note

# Parasites of Feral Horses from the Namib Desert, Namibia

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**ABSTRACT:** A quantitative study of the internal parasites from 3 horses revealed the presence of 4 nematode and 1 larval fly species. Additionally, 1 tick species was recovered. This horse population has ranged freely for more than 80 yr in the Namib Desert, Namibia. All 3 of the horses were infected with *Habronema muscae*, *Oxyuris equi*, *Probstmayria vivipara*, *Strongylus edentatus*, *Gasterophilus pecorum*, and *Hyalomma marginatum rufipes*.

The low population density of horses and few numbers and species of helminths are discussed in terms of a diminished helminth community. Further, the dynamics as an isolationist rather than interactive community are discussed.

**KEY WORDS:** nematodes, stomach bots, ticks, horses, survey, Namibia.

Eighty years ago a small group of domestic horses were released into the Namib Desert of Namibia. According to circumstantial evidence, this population of horses descended from military stock bred for the army and police in German South West Africa before World War I (Van der Merwe, 1984) but exact numbers of the original group are unknown (Van der Merwe, 1994, pers. comm.). Since then, they have roamed an isolated area of 400 square mi on the gravel plains of the Namib Desert (Coulson, 1987). Their habitat forms part of a restricted mining area, and they have been protected from all but natural predators. Two watering points were provided in recent years. As a result of this protection and the provision of water, the horses numbered 400 in 1991 (Ministry of Wildlife Conservation and Tourism, Namibia, 1991, pers. comm.).

To prevent overpopulation, horses were either translocated or removed randomly by culling. The latter provided an opportunity to collect various biological specimens including samples for quantitative examination of internal and external parasites.

The 2 vegetation types of this area (26–28°E, 14–18°S) are “desert and succulent steppe” and “semi-desert and savanna transition” (Giess, 1971). Grazing consists predominantly of *Stipagrostis* spp. on calcareous soil (Meyer, 1988). The mean annual expected rainfall in this region is 50–100 mm (Department of Water Affairs, South West Africa/Namibia, 1977, unpubl. data).

In April 1991, 3 adult horses were randomly selected and sacrificed, each with a cervical shot. These horses included 2 stallions between 2–5 yr of age and 1 mare of 4 yr. Condition scoring for the horses, based on a 0–10 scale according to Henneke et al. (1983), ranged between 4 and 5. The postmortem examination and collection of internal parasites followed the methods of Malan et al. (1981a, b). The cranial mesenteric arteries were examined for larval stages of *Strongylus vulgaris*. For ease of transport, modifications to these methods included formalin fixation of arteries and gut walls rather than freezing.

Macroscopic lesions were noted in the cecal and colonic walls of the large intestine. Specimens of affected tissues were collected and preserved in 10% buffered formalin. These were processed in paraffin wax, sectioned at 6  $\mu$ m, and stained with hematoxylin and eosin. Histopathologically there was a prominent submucosal edema and tissue eosinophilia in the lamina propria, which was consistent with migration, but no parasites were observed.

Accession numbers for specimens deposited in the U.S. National Parasite Collection (USNM) (Beltsville, Maryland 20705, U.S.A.) are as follows: *Habronema muscae* (USNM 83514), *Oxyuris equi* (USNM 83515), *Strongylus edentatus* (USNM 83516), *Gasterophilus pecorum* (USNM 83517), and *Hyalomma marginatum rufipes* (USNM 83518). Nematodes, fly larvae, and ticks were identified according to Lichtenfels (1975), Zumpt (1965), and Howell et al. (1983), respectively.

The prevalences, mean abundances and intensities, and ranges of parasites for each of 4 nem-

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**Table 1. Numbers of parasites in 3 horses from the Namib Desert, Namibia.**

Parasite	Prevalence (%)	Mean abundance and intensity	Range
<b>Nematodes</b>			
<i>Habronema muscae</i>	100	142	18–284
<i>Oxyuris equi</i>	100	222	1–658
<i>Probstmayria vivipara</i>	100	616,762	80,110–1,255,670
<i>Strongylus edentatus</i>	100	9	2–23
<b>Diptera</b>			
<i>Gasterophilus pecorum</i> * (third instar)	100	796	450–982
<b>Ticks</b>			
<i>Hyalomma marginatum rufipes</i>	100	3	1–5

atodes, 1 oestrid fly species, and 1 tick species recovered from the hides of the horses are listed in Table 1.

The species of internal parasites reported here concur with those known from elsewhere in the horse (Zumpt, 1965; Lichtenfels, 1975; Krecek et al., 1989). However, the diversity of species in the present study was considerably less if compared to other reports. Twenty-six nematode and 3 *Gasterophilus* sp. were recovered from horses in South Africa (Krecek et al., 1989) and 14 nematode species from 3 Hartmann's mountain zebras studied in 2 areas in Namibia (Scialdo-Krecek et al., 1983). The present study reports an overall higher prevalence in all horses examined, that is 100% for all nematode and fly parasites, than has been found previously in southern Africa. Two exceptions are the nematodes *Probstmayria vivipara* and *Crossocephalus viviparus*, which were present in all of the zebras in a previous study (Scialdo-Krecek et al., 1983). In addition, these parasites were more abundant than in the zebra studies, while *O. equi* and *S. edentatus* occurred in larger numbers than in the previous horse study (Krecek et al., 1989). The smaller diversity of strongyle species, limited to only *S. edentatus*, could be attributed to minimal availability of grazing. Migration of infective larvae from feces to herbage and their subsequent ingestion is the principle means of transmission (Levine, 1980). Furthermore, the lack of moisture in the environment probably limits the development of these parasites and their intermediate hosts (i.e., *Musca* spp. are the intermediate hosts for *H. muscae*). Finally, the stocking rate of horses in the area was low (i.e., 400 horses in 400 square mi) and may have further reduced transmission.

It is significant that horses were infected with 6 different parasites in their semi-desert environment. The life cycles of these parasites are largely mediated by environmental factors (i.e., moisture levels). In spite of extreme conditions, these parasites continue to exist, suggesting extreme survival limits.

Stable high population densities at a host's epicenter of origin tends to support larger numbers of more numerous species of helminths (a well-developed helminth community), whereas the unstable lower population densities of a host species at the periphery of its range may support fewer numbers and species of helminths (diminished or no helminth community) (Radomski et al., 1991). This concept may partially explain the lack of species diversity and low numbers of helminths in these horses from the Namib since larger numbers and more numerous species of helminths exist where this host is more numerous.

When our data is considered in terms of helminth infracommunity dynamics (Pence, 1990), a number of criteria suggest that this is an isolationist community versus an interactive community. Criteria that support this are low probability of colonizing the horse host, low vagility, and 2 direct versus 1 indirect life cycles (additionally, *Probstmayria vivipara* is probably direct). Further, niche utilization includes low mean species diversity and low number of high density species. According to Radomski et al. (1991), invasion of a host species into a new locality may be more successful if the colonizing species is free from specific pathogenic parasites infecting it in the original habitat. Certainly the success of this horse in its desert habitat has been enhanced by the absence of helminth parasites.

We thank A. Davis, B. Dungu-Kimbenga, R. Hartman, and T. E. Krecek for technical assistance, N. P. J. Kriek for assistance with pathological lesions, R. Hawthorne and M. Roods and their staff as well as the Ministry of Wildlife Conservation and Tourism of Namibia for their cooperation, F. J. van der Merwe, E. T. Lyons, S. C. Tolliver, and D. B. Pence for helpful comments concerning the manuscript, and both the Foundation for Research Development and the University of Pretoria for financial support.

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